Travel Time Study
Executive Summary

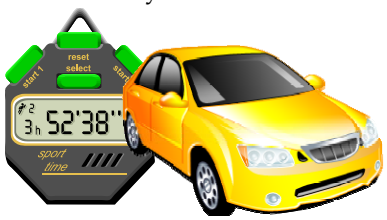
WAMPO

Wichita Area Metropolitan Planning Organization

What is a Travel Time Study?

A Travel Time Study provides officials, planners, engineers, and the public with actual information on how long it takes to travel along key routes in the region. The study collected data along approximately 250 miles of arterial streets, highways, and freeways in the WAMPO region. The data included speed, travel time, delay, as well as posted speed limits, number of travel lanes, and traffic volume. This data was collected and evaluated during the morning and afternoon commuter periods when most people are traveling to and from work or school. The data was used to evaluated travel time trends on a region-wide basis.

Another element of the Travel Time Study was an examination of the delay caused by at-grade train crossings. The duration of train delays and the number of vehicles stopped at the crossings were collected at 20 key crossings. The existing rail crossing warning devices were also identified at each crossing. This Executive Summary highlights the key data collected and the results of the study.



Why is the Study Needed?

WAMPO staff, decision makers, and stakeholders in the region will use the study results to evaluate regional transportation needs. The Travel Time Study is separate from, but closely related to work that WAMPO has conducted in recent years on the Congestion Management Process (CMP). Travel time data, when evaluated with other CMP performance measures, could help identify where improvements to the system are needed most. These improvements could include increased roadway or transit capacity, improved signal coordination, intelligent transportation system (ITS) strategies or other travel demand management strategies.

The CMP identifies performance measures that address the needs and characteristics of the region. To date, the following three key criteria have been used to measure the performance of the transportation system:

- Volume to Capacity Ratio (V/C ratio)
- Transit On-Time Performance
- Accident Location and Mapping Analysis

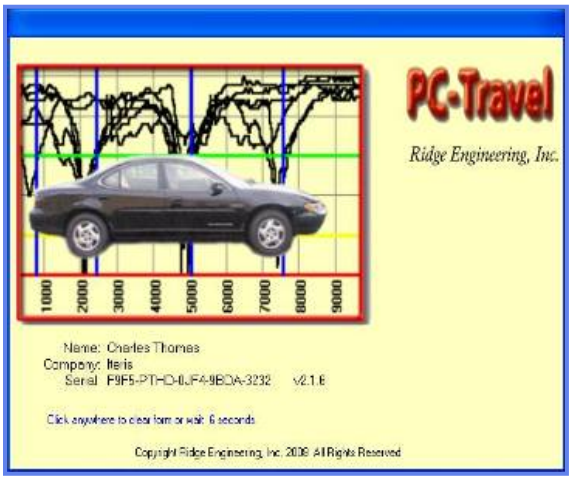
Travel time data can help determine the Level of Service (LOS) of specific road segments. Level of service is a measurement of how efficiently vehicles are moving along a road. The performance measures can also be compared to the travel demand model output to improve the model as a predictive tool of travel time, delay, V/C ratio, speed, and LOS.

The combined performance measures and travel demand model can be used as tools to help identify congested areas and provide insight into the causes of congestion.

How was Travel Time Data Collected?

The data was collected using a global positioning system (GPS) connected to a laptop computer in a car. Six travel time runs were collected on each road for each direction during the AM (7:00 - 9:00 a.m.) and PM (4:00 - 6:00 p.m.) peak travel times using the floating car technique. The floating car technique involves driving like an average vehicle on a road by passing one vehicle for every vehicle that passes the test vehicle.

For rail crossings, the general data collection process included recording the safety devices present at each location, the start and the end time of vehicles stopped due to the passing train, and the number of vehicles waiting at the crossing in both directions. Special conditions such as side streets that are blocked by the line of waiting cars or multiple vehicles taking a side street to avoid or get around the train were also identified.



How Does This Study Affect Other WAMPO Plans?

The data collected as part of the Travel Time Study may also support other plans completed by WAMPO. Examples include:

Metropolitan Transportation Plan (MTP) 2035: The Travel Time Study can be used to refine the regional travel demand model to account for rail crossing delays that currently are unaccounted for in the model and verify regional travel times between key locations. The data collected in the Travel Time Study may also be considered in future MTP updates related to freight, congestion management, ITS technology, and how projects are prioritized. The data collected in the Travel Time Study can assist in the creation of performance measures for the MTP 2035. The performance measures could be the number of vehicle stops along a corridor, average vehicle speed, total travel delay, and level of service (LOS).

Railroad Crossing Plan: The WAMPO Rail Crossing Plan was a resource document used to identify the rail crossing locations to evaluate as part of the Travel Time Study. The rail crossing delay information has the potential to be integrated into any future updates to the Rail Crossing Plan. For example, the Travel Time data at rail crossings could be used to support the decision making process to identify locations where quiet zones, grade separations, and crossing consolidation should be focused.

Household Travel Survey, Wichita Railroad Master Plan, and Signal Coordination Projects: These are all on-going projects that can potentially use the travel time and delay data collected in the Travel Time Study.

What Travel Time Concerns Were Identified?

The highway/freeway corridors with the highest delay per mile are the highway segments with traffic signals. The top four corridors listed are highway segments that consist of at-grade intersections with traffic signals, while the other segment is a freeway segment that contains grade separated intersections. The traffic signals explain why these corridors experience greater delay per mile than the other freeway corridors. The freeway segments experienced less than 30 seconds of delay per mile during both the AM and PM periods. This delay is related to the higher traffic volumes during the AM and PM peak hours. The top five highway/freeway corridors by delay per mile, based on the average of the AM and PM peak hour delay per mile, are:

- US-54—Kellogg Street to K-96
- K-15—Wassal Street to Buckner Street
- US-54—183rd Street to 111th Street
- K-42—Pawnee Street to MacArthur Road
- US-54—Woodlawn Street to Kellogg Street

The rankings of arterial corridors with the highest delay per mile reveal that eight of the top ten segments in delay per mile during the AM period also appear in the top ten of the PM period rakings. These corridors have either 1) high signal density along a portion of the corridor, 2) heavy traffic volumes, or 3) both. High signal density along a corridor does not necessarily create more delay, but can make signal coordination more difficult. Heavy traffic volumes can slow down traffic flow and increase traffic at intersections, which may cause drivers to wait multiple traffic signal cycles to go through an intersection. The top five arterial corridors by delay per mile, based on the average of the AM and PM peak hour delay per mile, are:

- Harry Street—Seneca Street to McLean
- Washington Street—US-54 to Central Avenue
- S. Seneca Street —Central/McLean to Pawnee
- Rock Road—37th Street N. to Harry Street
- 13th Street —Zoo Boulevard to I-135

The tables below summarize the key data for the locations with the most delay.

Top Five Highway/Freeway Corridors by Delay per Mile

Corridor	Start	End	Miles	Delay (seconds)			Delay (s) per Mile
				NB / EB	SB / WB	Total	
US-54	Kellogg St	K-96	2.57	135.2	113.7	248.8	96.81
K-15	Wassal St	Buckner	6.64	202.6	159.9	362.4	54.58
US-54	183rd St	111th St	4.50	105.7	139.2	244.9	54.42
K-42	Pawnee St	MacArthur	5.05	120.0	116.2	236.2	46.76
US-54	Woodlawn	Kellogg St	1.63	3.4	36.5	39.9	24.48

Top Ten Arterial Corridors by Delay per Mile

Corridor	Start	End	Miles	Delay (seconds)			Delay (s) per Mile
				NB / EB	SB / WB	Total	
Harry St	Seneca	McLean	0.34	46.2	44.5	90.7	266.62
Washington	US-54	Central	1.02	72.5	98.9	171.3	167.94
S Seneca	Central/McLean	Pawnee	2.7	173.8	193.6	367.4	136.06
Rock	37th St N	Harry	6.03	369.2	366.8	736.0	122.05
13th	Zoo	I-135	4.11	245.9	217.3	463.2	112.70
Southeast Blvd	US-54 WB Ramp	Wassal St	2.77	139.1	167.8	306.9	110.79
Woodlawn	45 St N	US-54	5.97	361.7	292.1	653.8	109.51
Oliver	US-54	I-35	2.50	121.5	150.2	271.7	108.66
Webb	K-96	Pawnee	6.03	323.9	310.2	634.1	105.15
Broadway	13th St N	Pawnee	4.02	211.1	198.8	409.9	101.95

Where are the Greatest Rail Crossing Delays?

There were several average delays at rail crossings lasting longer than three minutes and two crossings with average queues of more than 100 vehicles. It is important to remember there are a lot of variables involved in creating vehicle queues including the length of the train, the train speed, time of day, and vehicle volumes.

The five locations with the longest average train delay include:

1. Location 3 BNSF at E. 21st Street N. – 193 seconds (3:13)
2. Location 5 UPRR at Harry Street – 189 seconds (3:09)
3. Location 19 K&O at Maize Road – 189 seconds (3:09)
4. Location 13 K&O at Seneca Street – 186 (3:06)
5. Location 17 UPRR at MacArthur Road – 183 (3:03)

The five locations with the most vehicles delayed on average include:

1. Location 13 K&O at Seneca Street – 112 vehicles
2. Location 6 BNSF at Harry Street – 108 vehicles
3. Location 14 UPRR at Pawnee Street – 97 vehicles
4. Location 9 BNSF at W. 53rd Street N. – 40 vehicles
5. Location 7 BNSF at E. 63rd Street S. – 38 vehicles

What Other Rail Crossing Issues Were Identified?

In the course of collecting rail crossing times, a few other rail crossing issues were identified:

- The spur line that services Spirit AerosSystems and crosses K-15 exhibits some safety concerns due to the interaction between rail and highway traffic.

There are no gates at this crossing. During high traffic periods, cars stop on the tracks as a result of the traffic signal at MacArthur Road. Another issue is the train engine pushing rail cars across K-15 after sunset. Vehicles on K-15 proceed across the rail track despite the flashing lights because they don't see the crossing rail cars approaching K-15.

- A couple of low volume rail lines presented a challenge reaching the planned number of observations —K&O crossing of Maize Road and the UPRR crossing of Woodlawn Boulevard. These are not rail crossings with long-term queue/delay issues.

At the K-15 crossing, vehicles proceeded across the rail track despite the flashing lights...

- Construction at Broadway Street and E. 21st Street N. potentially impacted normal or typical travel patterns in the area during data collection. Instead of two lanes in each direction, only one lane in each direction was allowed due to construction activities and traffic management. This affected the queues at the rail crossings.

How can the Travel Time Data be Used in the Future?

Travel time and delay data has several purposes and potential uses. The Travel Time Study data can be maximized by incorporating it into other processes or plans including air emissions studies, travel demand model calibration, and rail crossing investments (grade separation). Potential examples could include:

- Future updates to the Rail Crossing Plan, MTP 2035, and the CMP may incorporate some of the data collected from the Travel Time Study.
- The travel time data could potentially be used as an input into a benefit-cost analysis of roadway improvements.
- The data can be used to identify congested locations and compare these with the travel demand model.
- The Travel Time Study analysis includes measurements of fuel use and emissions. This can be used to assess air quality impacts at project, corridor, and/or regional levels.
- Travel time and average speed data can verify the travel demand model and adjustments can be made as needed.
- WAMPO is currently working on performance measures to measure effects from Transportation Improvement Program (TIP) and Metropolitan Transportation Plan 2035 (MTP) implementation. The travel time data could be used as a baseline in some of these system performance measures and to compare the impacts of specific projects.
- The Travel Time Study results can be used by agency staff to identify corridors that may require further study to improve potential causes of congestion including capacity constraints, signal timing, rail crossing delay, and access management.
- The Travel Time Study can serve as baseline data for future corridor studies.

A travel demand model is a computer program that uses land use characteristics and typical travel patterns to determine future demand on the transportation system.

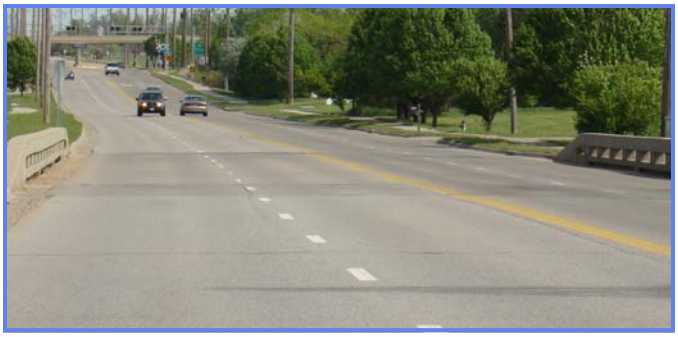
Performance measures will help determine how we're doing, where to improve, and where to allocate money.

How Was the Public Involved?

The Travel Time Study was primarily a data gathering exercise. As a result, public involvement activities have focused primarily on informing the public about the Study through regular WAMPO public notices and activities. An Advisory Group made up of representatives from the WAMPO Transportation Policy Body (TPB), Technical Advisory Committee (TAC), Kansas Department of Transportation (KDOT), and other local officials provided guidance for the study. Information on the study was placed on WAMPO's Website and Facebook page. Updates on the study were also provided in WAMPO's quarterly newsletters. Additional opportunities for public comment on the study, such as open houses, are also provided.

What are the Study Recommendations?

The largest causes of delay along the arterial roads are limited traffic progression, control delay, and four-lane undivided roadway segments that can impede left-turn movements and reduce roadway capacity and safety. Limited traffic progression means that drivers must frequently stop at intersections and for other reasons. In other words, vehicles cannot maintain a consistent flow and speed. Control delay due to traffic signals and rail crossings is the largest form of delay experienced along arterial roads. The City of Wichita is currently involved in a signal optimization project that should improve the delay along some of the corridors that are indentified in this study. The second largest cause of delay along corridors is the roadway type, specifically four-lane roadway sections. These sections are typically undivided and lack left-turn lanes, which causes delay when drivers have to wait for vehicles to turn left across traffic.



Example of four-lane roadway without turn lanes.

As with the arterial roads, traffic flow is interrupted along the signalized highway corridors. Some of these corridors may be part of the on-going signal optimization project initiated by the City of Wichita.

The freeway segments studied experienced less than 30 seconds of delay per mile during both the AM and PM peak hours. The delay that was experienced along the freeway segments can be attributed to the higher traffic volumes of the peak hours.

> Control delay due to traffic signals and rail crossings is the largest form of delay experienced along an arterial corridor.

The key recommendation from this study is to seek opportunities to improve traffic progression, reduce control delay, and eliminate left-turn conflict issues where possible on four-lane undivided roadways. Opportunities to improve access management should also be considered whenever possible in the planning and design process.

Other recommendations from the study include using the data to evaluate regional transportation needs as part of updating the Congestion Management Process. The data should also be used in conjunction with other plan updates and implementation including the Metropolitan Transportation Plan 2035, the WAMPO Rail Crossing Plan, the City of Wichita Railroad Master Plan, and various signal coordination projects. Data from this study can also be used in the development of performance measures for regional transportation.

Where do I get More Information?

W A M P O

Wichita Area Metropolitan Planning Organization

455 N. Main Street
Wichita, KS 67202
T: 316.268.4391
F: 316.268.4390
www.wampoks.org

All WAMPO documents referenced in this summary can be found on this website.